

In the Specification

Kindly replace paragraph [0001] with the following:

Technical Field

[0001] The present invention This disclosure relates to a suede-like artificial leather having excellent light fastness, brilliant coloration and good surface appearance, and also to a method for producing said artificial leather.

Kindly replace paragraph [0002] with the following:

Background Art

[0002] Suede-like artificial leathers with a structure in which a fiber-entangled substrate composed of ultra-fine polyester fibers is impregnated with a polyurethane are used not only in high quality clothing field, but also in various other fields including the interior materials of automobiles and furniture use, since it is excellent in high quality appearance, surface touch, coloration, etc.

Kindly replace paragraph [0004] with the following:

[0004] For example, as for the properties required in view of sensibility, further improvement of softness as leather stuff and further improvement of surface appearance are required, and as for the properties required in view of functions, further improvement of light fastness is required.

Kindly replace paragraph [0006] with the following:

[0006] That is, in the use for the interior materials such as seats of cars ~~running outside~~, it usually occurs that the interior materials are exposed to light such as sunlight for long periods of time during driving, parking, or the like. If this is repeated for years, there occurs a phenomenon that the ~~color~~ color, beautiful in the ~~beginning~~ beginning, is ~~gradually~~ gradually degraded ~~gradually~~.

Kindly replace paragraph [0007] with the following:

[0007] The phenomenon of color degradation (discoloration and fading) and crocking in contrast to the very deep colored beautiful state rich in high quality impression of a new car in the beginning makes one feel can be a large difference. Furthermore, a car owner who feels affection for the car wishes to use the car for 5 years or 10 years or even for a longer period of time. So, any improvement is required to be made for preventing the color degradation and crocking.

Kindly replace paragraph [0008] with the following:

[0008] That is, it is desired, as an improvement of color fastness, that the initial beautiful color of a brand-new artificial leather is maintained even if it is used in severe conditions for a long period of time.

Kindly replace paragraph [0011] with the following:

[0011] To improve this problem, reduction cleaning is carried out for, for example, decomposing or decoloring the dye in the polyurethane. However, on the other hand, the treatment of reduction cleaning involves another problem that the polyurethane ~~becomes while conspicuously~~.

Kindly replace paragraph [0016] with the following:

[0016] Furthermore, in the latter method (JP5-321159A), in the case where a polyurethane containing a perylene-based black pigment or an azomethine-azo-based black pigment capable of reflecting near infrared radiation is used, ~~the inventors variously examined and it was~~ found that these black pigments have a problem that the degree of blackness (pitch blackness) is very low, even though a high temperature as caused by said carbon black does not occur. Therefore, even if the pigment concentration is raised, there ~~arise arises~~ another problem that deep black cannot be obtained, and in addition, a further other serious problem that the reduction cleaning performed after dyeing causes decoloration or discoloration, to virtually deprive the polyurethane of its color in the

final product observed or to discolor in such a manner that different color zones are formed. As a result, the color depth is lost, and the surface appearance is remarkably degraded. So, no graceful artificial leather giving a high quality impression can be obtained.

Kindly replace paragraph [0018] with the following:

Disclosure of the Invention

[0018] In view of the above-mentioned matters, ~~a first object of this invention is it would be advantageous to provide a suede-like artificial leather using ultra-fine polyester fibers, which has all of excellent light fastness, brilliant coloration and good surface appearance[.] and a method for producing a suede-like artificial leather using ultra-fine polyester fibers, which have the above-mentioned features.~~

Kindly replace paragraph [0019] with the following:

[0019] ~~Furthermore, a second object of this invention is to provide a method for producing a suede-like artificial leather using ultra-fine polyester fibers, which have the above-mentioned features.~~

Kindly replace paragraph [0020] with the following:

Summary

[0020] ~~The suede-like artificial leather of this invention for achieving said first object has the following constitution:~~

Kindly replace paragraph [0021] with the following:

[0021] ~~That is, We provide a suede-like artificial leather, which comprising comprises a fiber-entangled substrate mainly containing ultra-fine polyester fibers with a fiber fineness of 0.7 dtex or less and a polyurethane and is dyed, wherein said polyurethane contains at least one each of yellow~~

pigments, red pigments and blue pigments, and said the artificial leather satisfies all of the following properties (1) through (3) as measured by the methods described in the specification;

- (1) The infrared reflectance at 850 nm is 60% or more;
- (2) The surface temperature during light irradiation is 105°C or lower;
- (3) The light fastness is class 3 or better.

Kindly replace paragraph [0022] with the following:

~~[0022]~~ — Furthermore, the method for producing a suede-like artificial leather of this invention for achieving said second object has the following constitution.

Kindly replace paragraph [0023] with the following:

~~[0023]~~ — That is, We provide a method for producing a suede-like artificial leather excellent in light fastness, in which a fiber-entangled substrate mainly containing ultra-fine polyester fibers with a fiber fineness of 0.7 dtex or less is impregnated with a polyurethane, wherein the polyurethane solution used contains at least one each of yellow pigments, red pigments and blue pigments in such a manner that the coagulated film of the polyurethane solution satisfies all the following properties (4) through (6) when it is evaluated according to the methods described in the specification;

- (4) The infrared reflectance at 850 nm is 60% or more;
- (5) The discoloration ratio after reduction cleaning is 20% or less;
- (6) The chroma is 10 or less.

Kindly replace paragraph [0024] with the following:

~~[0024]~~ — This invention enables the production of a suede-like artificial leather having a graceful surface appearance with a deep hue free from specking and high light fastness, which has been a problem remaining unsolved in the suede-like artificial leathers using ultra-fine polyester fibers.

Kindly replace paragraph [0025] with the following:

[0025] The suede-like artificial leather of this invention thus obtained can be used suitably not only for applications as materials such as the interior materials of automobiles, furniture use, bags, shoes, gloves and the like but also for clothing use.

Kindly replace paragraph [0026] with the following:

~~The Best Modes for Carrying Out the Invention~~ Detailed Description

[0026] The suede-like artificial leather of this invention and the production method thereof are described below.

Kindly replace paragraph [0027] with the following:

[0027] The suede-like artificial leather of this invention comprising a fiber-entangled substrate mainly containing ultra-fine polyester fibers with an average fineness of 0.7 dtex or less and a polyurethane, and is formed in such a manner that the fiber-entangled substrate is impregnated with the polyurethane.

Kindly replace paragraph [0028] with the following:

[0028] As said the ultra-fine polyester fibers, for example, polyethylene terephthalate or any of its copolymers, polybutylene terephthalate or any of its copolymers, or polypropylene terephthalate or any of its copolymers can be preferably used.

Kindly replace paragraph [0029] with the following:

[0029] The ultra-fine fibers used in this invention can be obtained, for example, by a direct spinning method, or splitting a composite fiber convertible into a bundle of ultra-fine fibers and consisting of plural components, or dissolving and removing at least one component from a composite fiber convertible into a bundle of ultra-fine fibers and consisting of plural components.

The impregnation of the polyurethane per se can be carried out either before or after said splitting or said dissolution and removal of one component.

Kindly replace paragraph [0030] with the following:

[0030] The single fiber fineness of the ultra-fine fibers ~~used in this invention~~ is 0.7 dtex or less. However, for making the surface smooth and soft hand, 0.5 dtex or less is preferred. Furthermore, in view of denseness and coloration, a range from 0.01 dtex to 0.3 dtex is preferred.

Kindly replace paragraph [0033] with the following:

[0033] ~~In this invention, to~~ To form the fiber-entangled substrate, a long-fiber web is formed as in the spun-bond method, or a web is formed from short fibers by a conventional method such as using a card cross-lapper or a random webber. Then, needle punching or water-jet punching or a combination of them can be used for forming the fiber-entangled sheet.

Kindly replace paragraph [0036] with the following:

[0036] Then, ~~in this invention,~~ the fiber-entangled substrate containing these ultra-fine fibers is given a polyurethane. The polyurethane resin is described below in detail.

Kindly replace paragraph [0037] with the following:

[0037] ~~As the polyurethane used in this invention, basically~~ Basically any polyurethane can be used. However, in view of processability, product quality and the like, it is preferred to use any one or two or more in combination of polycarbonate diols, polyester diols and polyether diols respectively having an average molecular weight of 500 to 3000 as the soft segment.

Kindly replace paragraph [0040] with the following:

[0040] ~~In this invention, at~~ At least one each of the yellow pigments, red pigments and blue pigments with the following properties are added to the polyurethane. For a solvent solution, DMF

(dimethylformamide) or the like is added, and for an emulsion, water is added as a solvent. The solution is then stirred and mixed to prepare the polyurethane solution.

Kindly replace paragraph [0044] with the following:

[0044] ~~In this invention, being~~ Being yellow, being red and being blue means that they satisfy the following definitions.

Kindly replace paragraph [0047] with the following:

[0047] ~~And in this invention, being~~ Being yellow refers to a state in which the value of h^* is 45 to less than 135 while the value of C^* is 10 or more, and being blue refers to a state in which the value of h^* is 155 to less than 310 while the value of C^* is 10 or more. Being red refers to a state in which the value of h^* is 0 to less than 45 or 315 to less than 360 while the value of C^* is 10 or more.

Kindly replace paragraph [0049] with the following:

[0049] The suede-like artificial leather ~~of this invention~~ reflects, on its surface, infrared radiation, for being prevented from rising in temperature due to the heat accumulated during light irradiation, hence being prevented from being lowered in light fastness, and can prevent the pigments from being discolored by reduction cleaning, being able to sustain a graceful color tone.

Kindly replace paragraph [0050] with the following:

[0050] The suede-like artificial leather ~~of this invention~~ is 60% or more in the infrared reflectance of the artificial leather surface at 850 nm when measured by the method described later. If the value is less than 60%, the effect of preventing the heat accumulation during light irradiation is so small as to raise the surface temperature, and the intended effect ~~of this invention~~ cannot be obtained.

Kindly replace paragraph [0051] with the following:

[0051] Furthermore, the artificial leather ~~of this invention~~ is 105°C or less in the surface temperature during light irradiation. If the surface temperature during light irradiation is higher than 105°C, the artificial leather cannot have high light fastness, and generally the light fastness cannot be class 3 or better. So, the intended effect ~~of this invention~~ cannot be obtained.

Kindly replace paragraph [0052] with the following:

[0052] If the suede-like artificial leather ~~of this invention~~ is more preferably constituted, the surface temperature during light irradiation is 100°C or lower. If it is further more preferably constituted, the temperature is 95°C or lower, and if most preferably constituted, the temperature is 90°C or lower. So, it can have more excellent high light fastness.

Kindly replace paragraph [0053] with the following:

[0053] The artificial leather ~~of this invention~~ comprising a polyurethane with such a discoloration ratio after reduction cleaning, and having said the infrared radiation reflection capability and said the property of surface temperature during light irradiation can be produced by using the pigments to be added to the polyurethane, under a specific recipe satisfying said specific properties.

Kindly replace paragraph [0056] with the following:

[0056] However, according to various our findings ~~of the inventors~~, among those enumerated above, diketopyrrolopyrrole-based pigments are preferred as red pigments, and phthalocyanine-based pigments are preferred as blue pigments. Furthermore, as yellow pigments, azo-based pigments can be respectively especially suitably used.

Kindly replace paragraph [0057] with the following:

[0057] The property values of (4) through (6) of the polyurethane solution containing ~~said the~~ the pigments refer to the values of the polyurethane as a whole containing all pigments obtained by mixing all the pigments used for the polyurethane. Even if any pigment used alone does not satisfy the above property values, it is only required that the values obtained from the pigments mixed together are in the respective ranges. Using the pigments as a mixture is meaningful.

Kindly replace paragraph [0061] with the following:

[0061] When at least one each of yellow pigments, red pigments and blue pigments are mixed ~~in this invention, according to various our findings of the inventors,~~ it is desirable to mix at a ratio of yellow pigment : red pigment : blue pigment = 1 to 3 : 1 to 3 : 1 to 3 (by weight), though it is difficult to generally specify.

Kindly replace paragraph [0064] with the following:

[0064] ~~In this invention, the~~ The polyurethane solution having predetermined pigments mixed as described above is impregnated into the fiber-entangled substrate, and is solidified. The solidification method in this case can be either a wet method or a dry method. However, in the case where soft hand is desired, a wet method is preferred.

Kindly replace paragraph [0070] with the following:

[0070] Thus, the intended artificial leather ~~of this invention~~ can be obtained.

Kindly replace paragraph [0071] with the following:

[0071] The following measuring methods 1 through 6 ~~used in this invention~~ are described below.

1. Method for measuring the discoloration ratio after reduction cleaning of the pigments in a polyurethane film containing the pigments

2. Method for measuring the infrared reflectance of a polyurethane film containing pigments
3. Method for measuring the chroma of a polyurethane film containing pigments
4. Method for measuring the infrared reflectance of an artificial leather
5. Method for measuring the light fastness of an artificial leather
6. Method for measuring the surface temperature of an artificial leather during light irradiation

Kindly replace paragraph [0072] with the following:

1. Method for measuring the discoloration ratio after reduction cleaning of the pigments in a polyurethane film containing the pigments

[0072] The discoloration ratio after reduction cleaning of pigments in this invention refers to the degree in the change of L*-value before and after the reduction cleaning of the film formed using the polyurethane solution to be impregnated into a fiber-entangled structure when the artificial leather of this invention is produced. It is measured as described below.

Kindly replace paragraph [0075] with the following

[0075] Furthermore, in the case where a polyurethane emulsion is used as the polyurethane to be impregnated, the film is formed according to the following method. At first, a horizontal aluminum sheet of 40 cm square provided with a frame for preventing the liquid from spilling from its sides is prepared, and the said polyurethane solution is poured to a liquid height of 1 mm. Then, it is dried at 130°C for 20 minutes, while it is kept horizontal, and the film is separated from the glass sheet.

Kindly replace paragraph [0079] with the following:

[0079] The L*-values of the polyurethane film before and after the reduction cleaning treatment are measured, and with the value before treatment as L*₁ and the value after treatment as L*₂, the

value A obtained from the following formula is called the discoloration ratio after reduction cleaning ~~in this invention~~.

Kindly replace paragraph [0081] with the following:

2. Method for measuring the infrared reflectance of a polyurethane film containing pigments

[0081] The infrared reflectance of a polyurethane film containing pigments ~~in this invention~~ refers to the infrared reflectance of the coagulated film prepared using the polyurethane solution to be impregnated into a fiber-entangled substrate when the artificial leather ~~of this invention~~ is produced. It is measured as described below.

Kindly replace paragraph [0086] with the following:

[0086] Using the R100 values and RSamp value obtained as described above, the value of the infrared reflectance ~~of this invention~~ is obtained from the following formula.

$$\text{Infrared reflectance} = (\text{Rsamp})/(\text{R100}) \times 100$$

Kindly replace paragraph [0087] with the following:

3. Method for measuring the chroma of a polyurethane film containing pigments

[0087] The chroma of a polyurethane film containing pigments ~~in this invention~~ refers to the chroma of the polyurethane film produced using the polyurethane solution to be impregnated into a fiber-entangled substrate when the artificial leather ~~of this invention~~ is produced. The coagulated film produced as described for measuring the discoloration ratio after reduction cleaning is cut into 10 cm squares, and four squares are overlaid for measuring under the following conditions. The measured chroma is called the chroma of the polyurethane film.

Kindly replace paragraph [0088] with the following:

[0088] As the measuring instrument, Minolta Spectrophotometer CM-3700d or a functionally equivalent instrument is used. As the light source, a halogen lamp is used, and D65 light source is

used as the measuring light source. The angle of visibility is 10 degrees, and magnesium oxide is used as the white plate for reference. The measuring diameter is 25.4 mm, and SCE is used for treatment of regularly reflected light. Under these conditions, the a* and b* in the L*a*b* color system specified by CIE (Commission Internationale de l'Eclairage) are obtained. The $(a^{*2} + b^{*2})^{1/2}$ obtained using the obtained values is the chroma of the polyurethane film ~~in this invention~~.

Kindly replace paragraph [0097] with the following:

Examples

[0097] ~~This invention is~~ The artificial leather product and method are described below in reference to examples.

Kindly replace paragraph [0099] with the following:

7. Evaluation of specking

[0099] ~~In this invention, specking~~ Specking refers to a phenomenon in which the appearance on the surface of an artificial leather is degraded since the polyurethane on the surface of the artificial leather becomes whitish to cause a color difference between the polyurethane and the fibers. The occurrence of specking was evaluated with eyes. A surface free from specking is indicated by o; a surface with some specking, Δ; and a surface with very conspicuous speckling, x.

Kindly replace paragraph [0119] with the following:

[0119] ~~This invention can~~ We provide a suede-like artificial leather highly improved in light fastness, which can provide more available hue variations, especially, for the interior materials of automobiles such as car seats, to expand the market and to encourage new demands, even though the conventional deep colored or medium deep colored artificial leathers could not be used because of such problems as fading and crocking.